

## Effects of Cement Chemistry, Admixtures, and Inhibitors On Internal Corrosion Protection of Steel Pipelines

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Internal cement lining is being implemented by the U.S. Strategic Petroleum Reserve (SPR) to mitigate erosive and corrosive degradation of pipelines used to transport brackish water and brine during site operations. In this presentation, results are summarized from a four year field study of 17 different cement formulations applied to the inside of plain carbon steel piping by a rotary centrifugal application method. API (American Petroleum Institute) RP10E calcium silicate-fly ash and non-standardized calcium aluminate formulations have been selected by the SPR for use based on the results of this study. These selections were made based on 1) linear polarization corrosion rate measurements from samples exposed to flowing solutions generated from site operations, 2) the mode and kinetics of brine transport through the cement material determined by electron probe microchemical analysis, 3) changes in the cement-steel interfacial shear strength determined by mechanical testing, and 4) visual inspection of corrosion occurring at the steel-cement interface. Details of the cement material formulations, application methods, test methods, and results will be given. The advantages and disadvantages of polymer admixtures and corrosion inhibitors for use in cement liners applied by rotary means will also be discussed.

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*Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under contract DE-AC04-94AL85000.*